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AMPLIFICATION OF THE RANGE OF AN OPHTHALMOMETER*

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It is an incident of not infrequent occurrence to encounter a corneal surface whose power of refraction so far exceeds the range of measurement of modern ophthalmometers as to render its evaluation only approximate, if it can be undertaken at all. Failure to obtain this measure of the corneal surface, in particular when astigmia and low acuity of seeing complicate the problem, often results in the selection of lenses which fail to function as correction lenses and accordingly provide little stimulus to the full exercise of the visual powers. For this reason faulty alignment of the visual axes often remains a concealed defect and can be made to reveal itself only when adequate correction lenses stimulate the sense of vision by which misalignment is ordinarily disclosed. Likewise and for the same reason the visual stimulus is often confined to a single eye, its more unresponsive mate under the handicap of a severe and baffling astigmia being all too readily consigned to that very much exiled group, the amblyopes. To have observed a vertical diplopia of eight units of prism which had for years escaped attention, and to have observed astigmias ranging from three to eight diopters which had likewise long been overlooked is to face the startling evidence of the indifference bestowed upon corneal measurements when its surface power exceeds the range of the ophthalmometer as ordinarily employed.

Modern ophthalmometers are not calibrated to exceed a range of measurement of 55 D., with the result that such instruments become ineffective in the measurement of a corneal surface whose power exceeds this limit, and only by special manipulation of the instrument may this power be ascertained. Corneal surfaces of 60 D. power are not extremely rare, and it is not uncommon to find upon such surfaces an inequality in power between its principal meridians rang-

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ing from five to ten diopters. The evaluation of refracting powers of this magnitude utilizes an ophthalmometer at the maximum limit of its range where readings become approximations unless the little known devices of manipulation are adopted in order to attain exact measurements.

The Genothalmic Ophthalmometer, owing to specific features of its construction, provides facilities of manipulation whereby its maximum range of measurements may be extended to 69.5 D., although the upper limit of its scale is reached at 55 D. No modification of the instrument, either optical or mechanical, is required to accomplish this, the extension of the range being brought about by the overlapping or contact positions of the mires when the scale is set for reading. This instrument essentially consists of a telescopic system facing an achromatic projection lens whose purpose is the projection of the corneal image of the mires into the telescope by means of parallel rays. The mires serve only the purpose of designating the extremities of the "object" which, located in the plane of the projection lens, is to be imaged by reflection in the corneal surface. The magnitude of this corneal image is governed by the power of the corneal surface which creates it, and when this magnitude is known the power of the corneal surface is attained by the application of a simple and well known law governing image formation in reflecting surfaces. This law embodies a relationship between the size of the "object" and its corneal image and may be express as

$$y = \frac{2\ u\ y'}{r}$$

in which y designates the magnitude of the "object," y' the magnitude of its corresponding corneal image, u the distance of the "object" from the corneal surface, and r the radius of curvature of this surface. The curvature of the corneal surface may be determined by this equation when an object of known size, at a known distance from the cornea is imaged by the latter, the dimensions of this image providing the third quantity in the equation essential to the determination of r. To surmount the difficulties attendant upon the measurment of this corneal image in the living eye, ophthalmometers have come into existence, utilizing in all models the original Helmholtz expedient of doubling this image in projecting it through the optical system upon the focal plane of the eyepiece. Application of the above equation to the determination of r, the radius of curvature of the corneal surface, allows the choice of two distinct, practical procedures. The determination of r may be made while maintaining y constant under which condition y' is subject to variation with the curvature of the corneal surface; on the other hand the determination of r may be made while y' is held constant, under which circumstance y varies

with the corneal surface under investigation. The choice of these two methods of application of this formula has allowed the manufacture of ophthalmometers to diverge in two distinct directions with the result that two distinct types of instruments are now available, one characterized by a constant and unchangeable "object" size, the other characterized by a constant and invariable image size at all measurements.

Upon this latter principle the Genothalmic Ophthalmometer has been constructed, the doubling of the corneal image, when projecting it upon the cross-hair of the eyepiece, being effected by the insertion of a double-image prism between the projection lens and telescope objective. In the absence of this prism, the corneal image is projected as a single image, unchanged in size, upon the cross-hair of the eyepiece; but when projected through the prism two images, unchanged in size, and separated at their centers by an amount equal to the doubling value of the prism appear upon the eyepiece focal plane. Upon the eyepiece focal plane, the doubling value of the prism reaches a value of 2.94 mm. and accordingly the dual images will overlap upon each other if the magnitude of each exceeds this dimension, while a distinct separation will exist between them if the magnitude of each falls below this dimension. It can be inferred, therefore, that contact of the dual images at their adjacent margins will exist when these images have attained a magnitude of 2.94 mm., since contact can only be brought about when these images equal in size the spacing between their centers. Owing to the equality in size existing between these images and the original corneal image, the magnitude of the latter is acquired and known to be 2.94 mm. when contact of the dual images is obtained by manipulating, in the necessary manner, the "object" size (mire spacing). This is the usual contact procedure pursued when setting this instrument for the measurement of a corneal surface. Fig. 1 displays not only this contact position, but also the overlapping and separation positions commonly observed by users of the Genothalmic instrument. When the mire track of this instrument has been rotated from a corneal principal meridian in which contact of the mires has been attained, into the remaining principal meridian of presumed higher power, the corneal image shrinks in size and the block and step mires appear overlapped upon each other's surface to an extent dependent upon the power differential between these two meridians. As indicated in the diagram the transformation of the overlapping into the contact position of the mire images necessitates an extension of the size of each of the dual images to a magnitude of 2.94 mm. and this is readily accomplished by enlarging the "object" or mire spacing. At this contact position the power of the corneal surface, as generally known, is indicated upon the scale of the instrument. The extent of mire spacing essential to create the transition from the overlapping to the contact positions of the mires is governed by well known laws govern-

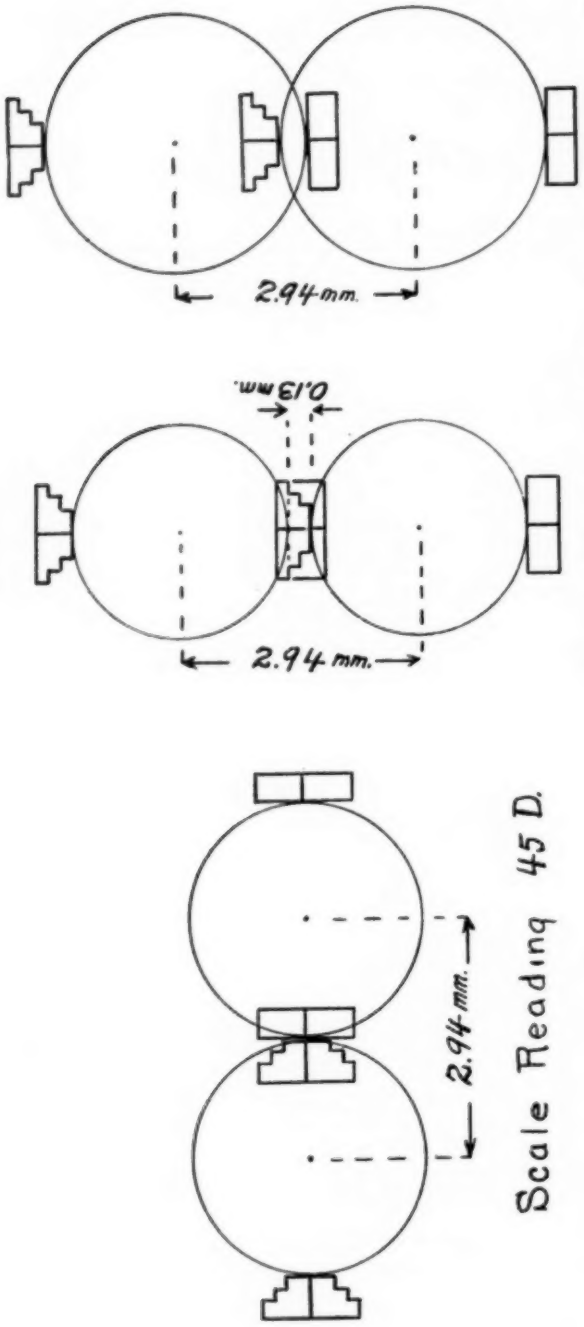

2.94 mm.
Scale Reading 45D
Power 43 D.
0.13 mm.
2.94 mm.
Scale Reading 45D
Power 47D.
2.94 mm.
Scale Reading 45 D.

Fig. 1

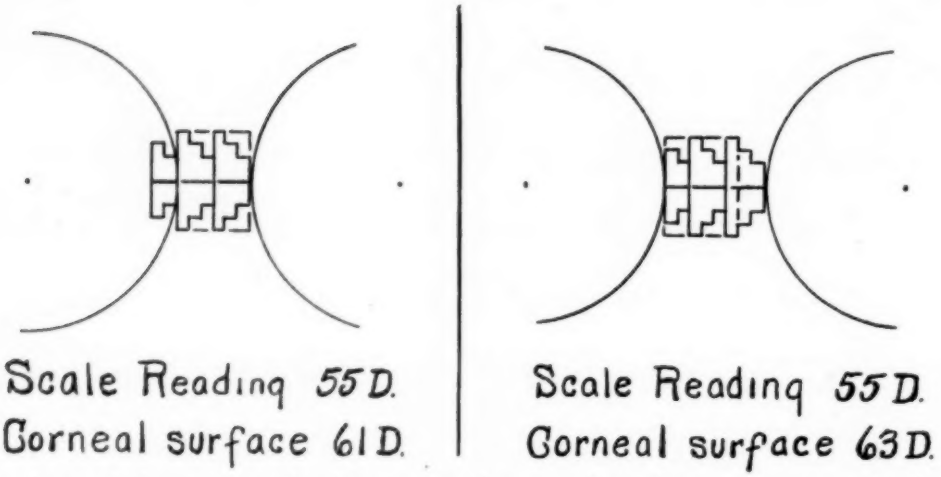
ing the operation of this instrument; laws which, if known, allow the power of the corneal surface to be ascertained from overlapping mire positions to the exclusion of the contact positions ordinarily obtained. This law may be conveniently stated as

$$x = \frac{2\ u\ d}{337.5}$$

in which x is the change in "object" size (mire spacing) corresponding to a change in corneal surface power equal to one diopter; u is the distance of the mires from the corneal surface; d is the constant doubling value of the prism which equals 2.94 mm. in the focal plane of the eyepiece. Now since the value of u equals 270 mm., the substitution of these values in the foregoing equation will yield a value of x equal to 4.7 mm., which implies a change in mire spacing equal to this amount in order to correspond to a change in power of the corneal surface equivalent to one diopter. Accordingly, if a power differential of one diopter exists between the corneal principal meridians, a difference in mire spacing equal to 4.7 mm. will exist when contact of the dual images is affected in each of the meridians. Recognition of this fact encouraged the designers of this instrument to adopt two distinct forms of mires, one rectangular, the other terraced, and termed respectively the "block" and "step" mires. The depth of each step was made equal to 4.7 mm. and the mire subdivided into eight of these steps thereby giving to it an overall width of 37.6 mm. The block mire was given a rectangular form and a width of 30 mm.

These relationships allow the determination of the power of the corneal surface in either of its principal sections from an observation of the extent of overlapping of the mires. As shown in Fig. 1 in which an overlapping of two steps has been arbitrarily selected, the power of the corneal surface is in excess of the scale reading by an amount equal to two diopters, since the "object" size (mire spacing) must be increased an amount equal to 9.4 mm. to secure the contact position usually desired when taking the scale reading. Now many instances arise in which this contact position of the dual images cannot be attained owing to the fact that even the maximum spacing of the mires (55 D.) is not adequate to enlarge the dual images to the dimensions necessary to bring them into contact. Under such circumstances the mires will remain in overlapped positions with the instrument scale indicating a value of 55 D. which, of course, is not the value of the corneal surface power. The true measure of this power readily emerges from the number of steps by which the terraced mire overlaps upon its mate and if, as shown in Fig. 1, this is two in number, the power of the corneal surface is known to equal 57 D. (scale reading increased by the number of diopters of overlapping). Upon this basis the overlapped positions of the mires may easily be

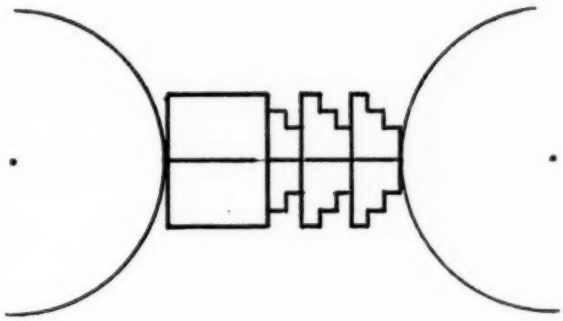
Fig. 2



given their correct significance and corneal surface powers vastly in excess of the range of the instrument evaluated. Fig. 2 displays several possible overlapped positions of the mires together with the corresponding corneal surface power as determined upon a basis of the scale reading and the extent of the overlapping of the mires. As may be inferred from the diagrams in Fig. 2, the extent of mire overlapping rises as the corneal surface power increases, and at the maximum mire spacing (55 D.) may have attained the position shown in

Fig. 3. It will be readily noted that the overlapping has here risen to a value equivalent to 14.4 D. which is the aggregate of the dioptral value of the block and step mires, and therefore, the corneal surface power is in excess of the instrument reading by this amount. Accordingly, a corneal surface power of 69 D. becomes susceptible to measurement by the Genothalmic instrument through the expedient of utilizing the mire contact shown in Fig. 3 and augmenting by 14.4 D. the scale reading at which this contact is secured. This procedure amplifies the range of measurement of the instrument by approximately 14.5 D., allowing the evaluation of corneal surface powers which lie between 30 D. and 69.5 D., all powers less than 44.5 D. requiring the usual contact of the mires as shown in Fig. 1, and all powers in excess of 55 D. requiring the mire contact shown in Fig. 3. In the measurement of all corneal surface powers which exceed the scale limit of 55 D. it is only necessary to secure the mire contact displayed in Fig. 3 and add to the indicated scale reading the 14.4 D. above referred to. Since this latter contact position represents a dioptral value which exceeds by 14.4 D. that shown in Fig. 2,

Fig. 3



Scale Reading 55 D.
Corneal surface 69.4 D.

it becomes evident that a corneal surface of 45 D. power is indicated as 30.6 D. upon the instrument scale when the mires are brought into contact as in Fig. 3. Similarly, a corneal surface of 50 D. power is represented upon the instrument scale as 35.6 D. and so on. Two dioptral values corresponding to each corneal radius of curvature might, therefore, be conveniently inscribed upon the instrument scale in order to render the instrument direct reading for all corneal surface powers comprised within the limits of 30 D. and 69.5 D. This method in manipulation of the instrument extends its range of usefulness and facilitates the acquisition of exact corneal surface measurements in many instances where only approximate data have heretofore been obtained.

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IMPOSSIBLE CORRECTIONS*

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Let's analyze our patients' difficulties with their bifocals and see why many of them will not wear them. Suppose you prescribe a plus 3. add to a pair of distant planos with a 22 mm. segment and see what happens when the patient glances through the edge of the segment at a distance of about six and a half feet down to the ground.

We all know the rules of decentering spherical lenses, and in this instance the distance from the center of the 22 mm. segment to the upper edge is 11 mm., this amount of decentration of the plus 3.00 D. sph. results in a 3.30 prism D. base-down. At six and one-half feet we therefore find that we have a jump or displacement of the object we are about to step upon while looking through the edge of the segment of about two and five-eighths inches, which is perhaps enough to make one occasionally stumble or miss their step. If the segment happens to be larger than this, then the displacement is proportionately greater, and less if it is smaller. If we change the size of the segment to 16 mm. we then decrease the displacement to about two inches. We still further decrease this jump to about one and one-half inches if the segment is reduced to 13 mm. We therefore find a logical suggestion for mono-centric lenses or smaller segments, especially in the higher adds should we encounter many patients that we wish to diagnose as neurotics because they will not wear their bifocals.

We have personally worn 13 mm. segments for many months with very little difficulty and doing quite a bit of reading. We also find no difficulty reading extensively with 16 mm. segments, having a range therewith of nearly three extra wide columns without moving the head, and there is no appreciable jump or displacement of objects on the floor with the low or medium adds, and we have practically no complaint from patients who have been fitted with segments according to these suggestions.

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Troublesome cases of asthenopia that is the result of looking below the centers of anisometropic corrections may be relieved by taking advantage of the use of different size segments in each eye in order to correct vertical prisms that is found in unequal corrections.

To illustrate: Your prescription calls for the right eye plus 1.50 sph., the left, plus 3.00 sph. with plus 2.50 add. bifocals. The vertical ductions are 1.50 prism D. This prescription cannot possibly be used in almost every case. Many of these patients have gone the rounds, finally discarding the bifocals as the cause of the asthenopia and doomed themselves to the inconvenience of two pairs of glasses that may not have been much more comfortable unless the reading pair were centered by some fluke of luck to take care of the base-up prism resulting from looking below the optic centers of this correction.

Let's analyze the correction: We find that the difference between the two lenses is 1.50 D. Upon looking 10 mm. below the optic centers we find according to the rule of decentration a base-up prism of 1.50 D. which is equal to the total amount of the vertical ductions. By making the segment of the left lens 2 mm. larger than the other we exactly neutralize the troublesome base-up prism. We need not make this much difference in the size of the segments if we make the segment of one lens a little higher and the other a little lower. Another plan is to use different types of bifocals in the pair of lenses, such as a mono-centric in one and a ground-in or fused in the other, or mono-centric lenses in both eyes, or a base-down prism in the segment that neutralizes the base-up prism in the distant lens.

We may readily see that unless there is some provision to take care of this type of case, that we must equalize the power of the two lens, or build up the ductions which should perhaps be advised in many cases at least.

The possibilities of the development of a troublesome vertical phoria as the result of the daily exercise of overcoming vertical prisms by looking below the centers of the distant correction should not be forgotten, and should one attempt to correct a phoria of this nature by vertical prisms in the distant correction, the result may be the same as that following the use of minus lenses in pseudo myopia. The cause of the phoria should be removed, then the phoria will take care of itself.

By taking care of unwelcome vertical prisms in these cases we may then largely ignore the empirical and time-worn rule of not prescribing more than 1.50 or 2.00 D. difference between the two lenses.

The same difficulties are of course found in astigmatic corrections of unequal powers when the axis is at or near zero. For instance: the right eye calls for minus 1.00 cyl. axis 180, the left, plus 1.00 cyl. axis 180. We find in this correction while looking 10 mm.

below the centers of the lenses 1.00 prism D. in the right eye base-down and in the left the same amount of prism base-up, with a total of 2.00 prism D. of vertical prism for the patient to overcome. This amount may be equal or more than the vertical ductions, therefore may be unbearable in a reading or working correction, while it may be comfortable for distant wear.

In the non-presbyope it may be decentered or neutralizing prisms added. The same thing may be done for the presbyope if two pairs of glasses are prescribed. If bifocals are used, then one of the above plans should be considered.

We find an infinite number of corrections calling for more or less difference between the lenses of the two eyes, many of which may not be worn with comfort though optically correct and wonder why. Corrections calling for moderate or higher differences between the two eyes must be centered according to an analysis of the patient's needs. If the correction is chiefly used for distance and there is not too great a difference between the two eyes, and the glasses are properly centered, then they may be comfortably used. If the difference is great enough to cause a resultant vertical prism that is close to the vertical ductions and the unequal correction prescribed for constant wear and this patient happens to use his eyes for any considerable time for near work looking eight or ten millimeters below or above the optic centers of the lenses, then decided asthenopic symptoms may follow.

There are several ways of correcting the difficulty; perhaps the simplest way is to decenter both lenses to correspond with the distance above or below that the patient looks through the lenses, provided that distance is not too great. If the lenses cannot be decentered enough, then we determine the amount of vertical prism resulting from looking below the optic centers and neutralize that amount by adding a prism to the correction. In either plan the patient will require two pairs of glasses.

We believe that most modern optometrists would instantly reject a pair of lenses a slight prism resulting from badly centered work, and very few opticians would dare send out poorly centered glasses and yet practically every refractionist will prescribe all kinds of unequal corrections and pay no attention at all to sometimes large amounts of impossible prisms resulting from such corrections on account of the patient looking most anywhere except through the optic centers of his correction, and more as an illuminating study—most every optician and refractionist that we have discussed the matter with is unable to see any virtue or necessity in the matter, and yet—we have seen years of misery and suffering on account of patients trying to wear these corrections.

To illustrate the virtue in the idea, let me cite an actual case: A presbyopic myope with a difference between the two eyes of about

2 D. had comfortably worn for several years segments with about 12 mm. difference between the two and then decided to have a big doctor in a large city look over his eyes. The renowned doctor after calling the patient's attention to the optometrist's mistake in the size of the segments, overlooked in his prescription the amount of vertical prism that resulted from the patient's anisometropia, which in this case almost caused diplopia when the patient looked down to read. Your imagination should tell you about the unbearable asthenopia resulting from his new glasses—and now the patient is again wearing a correction with different size segments with comfort.

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DISAPPEARANCE OF SCOTOMA AND MARKED CHANGE OF ASTIGMATIC CORRECTION AFTER TONSILECTOMY*

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Patient M. K., age 22, called to see me on June 26th, 1930. He was wearing the following correction:

O. D. + 0.75 D. sph. ⊃ — 3.25 D. cyl. axis 5
O. S. + 0.75 D. sph. ⊃ — 2.75 D. cyl. axis 5

This correction has been in use since May, 1929.

The patient complained of seeing a gray spot before his eyes most of the time. This spot he claimed moved with the eyes when the eyes were rotated. The spot proved to be a scotoma. Upon examining his throat marked hyperplastic and pussy tonsils were found, and their immediate removal was suggested. At previous times three physicians had suggested the same thing to him. I then prescribed:

O. D. + 0.75 D. sph. ⊃ — 2.50 D. cyl. axis 5 ⊃ ¾Δ base-down.
O. S. + 0.75 D. sph. ⊃ — 2.75 D. cyl. axis 5

Patient was instructed to return at frequent intervals, which he did but complained of not feeling well physically. He also complained that he was suffering from his eyes, they tired quickly and seemed to burn. A post-refraction showed no change. He called again February 9th, 1931. He told me that he finally had his tonsils removed during the preceding month. He reported feeling like a new person, but his eyes still gave him trouble. Upon re-examining him the following correction was prescribed:

O. D. — 0.25 D. sph. ⊃ + 0.75 D. cyl. axis 95
O. S. — 0.25 D. sph. ⊃ + 0.75 D. cyl. axis 95

Two weeks later the patient reported that his eyes were normal. The symptoms having disappeared. He no longer sees the spot before his eyes and the tired and burning feeling is gone. The scotoma had disappeared and the eye ground seemed normal.

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PSYCHOLOGY AND OPTOMETRY*

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There are many in our profession who maintain that psychology is not a science and, therefore, it is erroneous for the eye doctor to apply its principles in his optometric practice.

Whether psychology has a scientific standing one can readily ascertain if he is intellectually honest, by acquainting himself with the works of such scholars as James R. Angell, president of Yale University; Dr. E. L. Thorndike, of Columbia; Walter Dill Scott Cattell, Woodworth and others, and not by a reading of a compilation of articles by Murchison or listening to the words of wisdom of a gentleman like Chesterton, when he speaks of psychology as a "curse."

To say psychology is not a science because a large part of its terminology is theological, and that it is even today classified in some religious colleges among the "sacred sciences," a science of the soul; or because it plays a major part in many systems of philosophical thought, is the same as claiming that chemistry is not a science because its parent is alchemy or that astronomy is not a science because it evolved from star gazing of the astrologist. If we carry such logic to its conclusion it is justifiable to say that modern medicine is not a science because historically examined, the early men of medicine believed in a spiritistic theory of disease, an evil eye, charms, witchcraft and the like.

Clinical psychology is a science. The successful work going on at the many hospitals for the mentally ill and child guidance clinics in numerous cities over the country furnish us the data. The medical man and every member of the healing profession who has been trained to look at man as a chemical compound in a test tube will laugh, of course, at the quotation brought by Dr. Stafford as saying: "If the physician is unable to understand the mind, he cannot successfully treat the patient," or that disease symptoms are in many cases simply substitutes for strong suppressed emotions, such as the paralyses, convulsions and aesthesias, as Janet expressed it. But one who has been trained in the science of psychiatry and knows the art of its

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application to personality disorders can, indeed, recognize the useful role of psychology as a therapeutic.

Nervous disturbances and emotional obstructions express themselves through various physical symptoms and, since the eye is intimately related to the nervous system, therefore, it occurs that the eye in such cases is only a reflector of trouble in some other part of the organism. Realizing how deeply mental states influence physical conditions, a knowledge of medical psychology, therefore, will prove to be of tremendous value to the optometrist.

From the criticisms of psychology as a therapeutic one is impressed that the many critics are not broadly acquainted with the subject they attempt to criticize. No one really understands "mind" when we think of it as a metaphysical unit, a "mystical entity," a thing outside the field of sense perceptions. But psychologists do not understand "mind" as something outside and beyond the reach of scientific method. They do not dissociate mental phenomena from bodily functions; Dr. Alfred Adler, for example, uses the words "soul" and "psychic life" in his writings. Could an intelligent person, think for a moment that Adler's concept of "mind," "soul" is the same as the one of St. Paul of Bishop Manning?

Most critics in their opinion, that psychology is not a science rests upon the fact that there are many schools of psychology and that they disagree with each other. This fact is not to the discredit of psychology, but simply shows the depth and complexity of the individual's life, and that human behavior can be studied from various angles.

When one speaks of Watson versus Freud one should remember that behaviorism as a psychological and philosophical interpretation of man and mind grew out of the concept of behavior in animals. His experiments were carried out in the laboratory in terms of physical stimuli and responses, whether the subject of the experimentation was cat, ape or child. Psycho-analysis, on the other hand, was born in the doctor's office and in clinic. It was designed for the cure of those border line cases of mental disease which are known as hysteria, neurasthenia, compulsion-neurosis and the like. Psycho-analysis began, then, as a form of therapeutics and its chief service lies in this sphere.

Dr. Freud is a physician, and as such his contribution to medicine is of monumental import. As a philosopher, Professor Freud may be speculative and fantastic. That is another story.

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THE ANCIENT AND MODERN PROBLEM OF GLARE*

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In 1758 tinted lenses were used in England. Truly, there is nothing new under the sun! It is also interesting to note that the earliest optical studies were concerned with the nature of light.

Romer, the Danish astronomer, measured the velocity of light. Huygens advanced the wave theory of light. Sir Isaac Newton exploited the corpuscular composition of light. Thomas Young developed the interference theory of light waves.

Roger Bacon in 1266 gave serious attention to constructing lenses to correct weak eyesight, to relieve strain. Glasses to protect the "weak eyesight of old age" were advocated by spectacle makers in 1495. People with weak eyes largely composed the spectacle-wearing public a hundred years ago.

The idea that the wearing of glare-protective lenses is a modern fad, is contraverted by practical evidence. Of course, the contention advanced by leading refractionists that glare is largely a product of modern conditions is absolutely true. Modern reflective sources—glaring contrasts, vivid colors in dress, billboards, and house furnishings, artificial illumination—all of these so-called modern conveniences tend to inconvenience the eye increasingly by flooding the retina with excess light. Glare-protective lenses are not only needed today—to rapidly growing numbers they are a necessity.

The modern practice of prescribing lenses that absorb overbrightness, or glare, certainly cannot be classed as a fad. No more than pulling teeth with the aid of anesthetic—taking out the appendix—innoculating against colds—can be included in the "fad class" of modern medicine and dentistry. The effort to relieve eyestrain has been the constant endeavor of optical science since Galileo peered through the first telescope at the heavenly bodies. In fact, relief of strain has been the thematic objective of the optical movement from its inception in the 13th century. During the middle ages people knew nothing of astigmatism, myopia, presbyopia, color blindness or any of the common eye disorders with which we moderns are so

*Submitted for publication December 1st, 1930.

familiar today.

Glasses were fitted to protect weak eyesight—to relieve strain because this condition was considered serious by the spectacle makers of medieval times. If we get down to the root of all prescriptions today—the same general condition prevails. In your own corrections, isn't it always your first instinct to search for indications of strain and to relieve the strain where found?

Glare is not the only force that produces strain upon the eyes. But glare is the only force that is a contributing factor in every case of eyestrain. A certain eye defect may manifest itself by strain of one kind—an entirely different disorder may be the cause of strain of another kind. But in both cases the strain will be aggravated by glare and relief of the strain will be retarded by glare. In every correction, therefore, glare is one of the factors to consider. Absorb the glare from light and you speed up the relief your prescription is planned to give. You only remove part of the strain if you do not remove the irritating glare from the light. That's why—after a correction—patients frequently complain of continued discomfort.

The tinted lenses that were made and worn back in the 18th century were a creditable effort to provide relief. But they were probably ineffectual owing to the problems of introducing color into the glass, and even harmful because they made the eye insensitive to certain colors in light. Science later discovered that. Smoked or colored glasses dropped into disrepute because they changed the color values of light—subjected the eye to a distorted spectrum—and hence were habit-forming and dangerous. Colored lenses then were prescribed only in extreme cases of glarestrain, and even at such times with evident misgiving on the part of serious minded refractionists.

Today the rapid increase of glare, and the alarming growth of visual disorders due to glarestrain, has placed upon the refractionist the responsibility of removing glare with some safe and desirable means. We hear daily of movements directed against glare by sicentific bodies throughout the country. The city of New Orleans recently conducted a community campaign to exterminate glare. In Baltimore, the Wilmer Clinic of Johns Hopkins Hospital has changed the white tile of the operating room to dull grey surface finishes that do not reflect glare. Everywhere the menace of glare is being preached against—and fought with every available weapon. The most useful instrument in the optical campaign against glare has been provided by the scientific development in recent years of lenses that remove glare without disturbing the color spectrum or changing natural light in any way.

With these new neutral lenses the modern refractionist can prescribe against glare with every assurance that he is relieving strain by the most scientific method, and doing an added professional service which is a step forward in optics—a service that makes his skill more generally applicable to those who consult him.

PRISM TREATMENT OF FUNCTIONAL MYOPIA*

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Some few years ago, Peckham suggested the use of base-in prisms, both in the patient's correction and in exercises, for the control and correction of functional myopia. The writer was much interested in the claims made at that time and since has utilized the method in a very considerable number of cases.

Beside the original work of Peckham, there have been few reliable case reports on the subject while, as far as the writer knows, no real clinical research has been reported.

There is no question but that many myopic persons are wearing, and accept subjectively, far more concave lens value than the actual anatomical myopia warrants and there is no reason to doubt that this functional myopia is due to the same hypertonic ciliary condition as is encountered in young uncorrected hyperopes and in ciliary hypertonic conditions in general.

A certain definite amount of tonicity somewhat variable according to age, as shown by the writer in a previous report[1], and undoubtedly supplied through the proprioceptive system, is a normal property of the ciliary muscle. This basic tonicity is represented in skeletal muscular tissue by iso-metric contraction without actual shortening of the muscle, the innervation being just sufficient to produce tautness and readiness for work. By reason of excessive use, however, a condition of hypertonicity may be produced in such muscles due to the stimulation of the proprioceptive system by the presence in the tissues of considerable amounts of oxygen unsaturated products such as are always present after prolonged use.

Smooth muscle tissue, however, is known to be able to maintain a contraction for considerable periods of time at a low metabolic rate. The ciliary muscle, which is smooth muscle tissue, has no difficulty with sustained contraction as is frequently demonstrated in the young, simple hyperope who presents no asthenopia.

Where there is a constant effort of adaptation, however, as in the case of the hyperope who is also attempting to compensate for some low amount of corneal astigmatism, a ciliary cramp appears to

*An abridgment of material presented before the American Academy of Optometry at Boston, Mass., Dec. 17, 1929.

[1]A Quantitative System of Dynamic Skiametry—American Journal of Optometry, Vol. VI, No. 12.

develop quite readily. The majority of cramp cases which present themselves to the optometrist are of that type.

There is no reason to believe, moreover, that true ciliary hypertonicity is present solely in hyperopic cases. Myopes usually, if not always, develop from hyperopes and in many cases the cramp seems to continue throughout the change. In fact, there is every reason to believe that the initial hypertonic condition is an active factor in the development of myopia. Where small amounts of corneal astigmatism are present in low myopic cases the same factor of attempted compensation certainly is present. As a third process in the genesis of functional myopia, and certainly a very prevalent one, is the fact that many myopes are wearing excessive concave spherical corrections and improper astigmatic corrections due to the prevalence of subjective testing and the use of short term cycloplegics.

It should be noted that this proprioceptive factor is afferent and associative in nature while the actual motor response, which gives muscular tonicity, is distributed through the descending motor tracts and the third cranial nucleus in the same manner as are the motor responses resulting from the desire to clarify blurred images and from the influence of the convergent-accommodative reflex.

It is impossible to differentiate immediately, therefore, as far as the accommodative response is concerned, between that elicited by the proprioceptive, by the visual, or by the convergent stimuli. This fact should be borne in mind in any consideration of ciliary hypertonic conditions, as it is apparent that some difficulty may be encountered in determining the source of the afferent innervation to which a manifest ciliary cramp is due. It may be due either to a true proprioceptive stimulation or to an over efficient convergent-accommodative reflex arc.

It seems fairly obvious that in the first case the proper correction of the true ametropia and the corneal astigmatism will tend eventually to relax the excess accommodation by removing the cause. In the second type, however, the use of base-in prisms in addition, is indicated both for wear and for exercise in order to destroy the excessive convergent-accommodative habit.

These factors are well illustrated in the group of 75 cases reported herewith, which were selected from among a large number of cramp conditions in myopia. Because of the fact that each case has been carefully watched for one year or longer, the writer feels that the conclusions at which he arrives may be helpful in the development of a definite system of analysis and correction of the causative factors involved.

Due to the difficulty of differentiating one type of case from the other, the treatment of all the cases reported herein was designed

to correct either or both of the supposed causes, by the addition of weak prisms base-in to the actual refractive correction.

The chief difficulty which presents itself in the analysis and treatment of these functional myopic cases is the measurement of the actual structural ametropia. Many subjective methods for ascertaining this very essential value, have been suggested and developed, with but indifferent and unreliable results. It was not until the application of the writer's objective system of dynamic skiametric analysis that he found it possible to arrive at a usable approximation of the true error.

The general objections to the principal subjective dynamic systems used, the dynamic cross-cylinder test and the abduction at near procedure, both developed by Peckham, were two in number; first, with both methods the judgment of the patient was a very important factor; and, second, that the results were usually impossible to interpret in a quantitative manner.

Even if, therefore, the procedures could be carried out acceptably in an intelligent patient with no lenticular compensation for corneal astigmatism, they could, in no case, be used as a basis for even an approximation of the true structural ametropia. Where abnormal ciliary activity exists, as in compensatory lenticular astigmatism, no definite results, as a rule, could be obtained.

Due to the fact that compensatory lenticular astigmatism as diagnosed by the difference between the anterior corneal curvature, as shown by the ophthalmometer, and the total astigmatism as revealed with the retinoscope and subjectively is so common a condition in cases of convergent-accommodative stress, considerable attention was paid to the proper interpretation of the ophthalmometer findings. The experience of the writer is that if the ophthalmometer data, treated as will be suggested, agrees with the dynamic skiametric findings and both disagree with the static or subjective results, the patient will ultimately accept a correction of the order and type of the corneal astigmatism when the accommodative cramp is finally released. The only explanation for this frequently observed occurrence which the writer can suggest is that the cramp is probably due to the effort of the ciliary to compensate for the corneal astigmatism thus causing incessant ciliary activity which would tend to develop a temporary increased muscular tone. In the cases where the compensatory activity disappears under the dynamic test, it would seem that the additional accommodation required over and above the "cramp" accommodation results in ironing out the compensatory effect.

Another major problem was to find a method for arriving at a proper astigmatic element in the correction. Any compensation for anterior corneal irregularity must needs be lenticular as the relative

refraction of the posterior corneal surface as well as the anatomical factors involved make a compensation at that surface impossible. Angular incidence at the macula would produce irregular astigmatism which is certainly not the type noted in these compensation cases.

In this investigation the writer has discarded for the application of ophthalmometric results, the Javal rule, because of its manifest inaccuracy. Two factors must be considered in applying such results; first, that the position of the correcting cylinder at some 13 to 15 mm. in front of the eye requires a modification of its dioptric value due to the change in effective power by reason of its distance from the cornea; and, second, that a physiological lenticular astigmatism against the rule of uncertain amount but usually from 0.25 D. to 0.75 D. exists in the average case. This latter factor appears to be quite low or absent in youth but quite apparent in older individuals, the writer usually assuming a tentative value of 0.25 D. to 0.50 D. under age 30 and 0.50 D. to 0.75 D. in those older.

The lens effectivity, it should be remembered, depends not only on the dioptric value of the cylinder but also upon the value of the spherical lens which accompanies it. This means that the actual amount of cylindrical lens power which is needed to exactly correct two individuals with precisely the same amount of corneal astigmatism would differ materially if one were considerably hyperopic and the other quite myopic

This problem was taken over by a colleague, Dr. Julius Neumueller, whose work upon it resulted in an exhaustive and complete table of lens effectivities of all usual combinations of spherical and cylindrical powers. The writer will not present, in this paper, the results of Dr. Neumueller's calculations as they will be reported separately.

With a nearly exact knowledge of the effective cylindrical value, a close approximation of the axial refraction, and a judgment of the possible physiological astigmia, it is quite possible to do more than approximate the ultimate cylindrical element in the correction.

In attempting to relieve ciliary hypertonicity in any case, either hyperopic or myopic, the writer's experience indicates that good results can be obtained only when the patient gives whole-souled co-operation. Attention, due to desire, is absolutely necessary if the cramp is to be relieved. In each of the cases reported in this paper, the circumstances were carefully explained to the patient before treatment was inaugurated and a promise of co-operation was secured.

The writer believes, therefore, that as in all other corrective procedures, while the most important factor in the intelligent treatment of convergent-accommodative stresses is a correct diagonsis, quantitative as well as qualitative, of the underlying refractive con-

dition, the importance of the psychological attitude should be carefully considered.

Considerable attention has been paid by Peckham and others to the significance of the pupillary size and motility as an indication of the presence of functional myopia, or ciliary hypertonicity in general.

In this report it will be noted that the problem was attacked from a different standpoint in that no attempt was made at diagnosis by pupillary data although they were recorded carefully.

In the cases cited in this report there was no apparent correlation between pupillary size and the presence of functional myopia. It must also be kept in mind that as in the average case there is absolutely no knowledge as to the normal pupillary conditions. Judgment as to variations from the normal size in the absence of repeated previous periods of observation is not only useless but misleading.

In all of the case studies upon which this report is based, the method of analysis was identical and consisted of a thorough routine examination including very extensive and painstaking skiametric tests, both static and dynamic, the method in the latter being that developed by the writer; ophthalmometry; dynamic subjective methods; and a series of heterophoria determination. The latter, as will be seen, are a very important part of the analytical method used, and were taken after each refractive finding with the lens values determined by it.

Each individual was corrected by prescribing, for his refractive error, his analytical result, usually corresponding to the results of his dynamic analysis, in addition to base-in prisms for constant wear together with more or less constant base-in exercises.

Considerable difficulty was had in determining the correct amount of base-in prism to prescribe. The abduction recovery point method of Peckham was tried but results with it were not consistent, as it indicated very considerable amounts in some cases and none in others. Finally an arbitrary valuation of 2 to 3 B. I. each eye, was ordered in all cases and was found generally acceptable.

The exercises prescribed were of a specific character and were given chiefly by the kratometer and by the myoculator, although in a few cases the Wells method was used.

Due to the different occupations and circumstances of the patients, there was little uniformity in the method of giving the base-in exercises. Some patients were seen nearly daily for months, while others were limited to single weekly visits.

The usual method of procedure was to first use the myoculator for a few moments of binocular and monocular rotations, after which the kratometer was used for a series of five minute periods, first with the base-in prism bar before the right eye, then before the

left, and then with both right and left bars. Care was taken, during the procedure, to keep the prism power below the point of diplopia.

After each fifteen minute session, the patient was directed to relax for periods varying from ten minutes to one-half hour after which the procedure was repeated.

From among a rather considerable number of such treatment cases the writer has selected seventy-five, all of which have been treated by the above methods for at least one year. For statistical purposes these cases have been arbitrarily classified into two groups; high myopic, in which class are included those of more than 10 diopters; and those whose true correction is below that figure.

Following are the statistical data:

Classification	Number	Reduced	Not Reduced	Increased
High (over 10 D).....	8	4	4	0
Lower	67	20	35	12
	—	—	—	—
Totals.....	75	24	39	12

Results of treatment in 75 cases of functional myopia.

In the twenty-four cases where appreciable reduction of the myopic correction was had with visual acuity retained for distance, the average reduction was 1.25 D. and the average initial physiological exophoria with the first approximation was 3. In ten instances there was physiological orthophoria or physiological esophoria.

The thirty-nine cases which were not reduced showed an average physiological exophoria of 8$^{\Delta}$ with the first approximation.

In the twelve cases where the subjective requirements after the reduction procedure involved more minus lens value than before the average increase was between 0.25 D. and 0.50 D. In this group the average physiological exophoria with the first approximation was 16$^{\Delta}$.

All the latter cases showed a tendency toward an initial decrease in the manifest myopia with the treatment correction, manifested by increased visual acuity. This, however, seemed to continue in no case for more than a week or two after which the subjective requirement seemed to be about the same as it was before the treatment was inaugurated. When the prismatic element in the correction was removed, however, the visual acuity fell considerably and more minus value was required.

It will be noted in comparing the foregoing results, that there are certain outstanding facts; first, that not all myopes will respond to treatment even if they are apparently of a functional type; second,

that success in the treatment procedures was confined largely to those who showed closely related accommodative-convergent functions as shown by the low physiological exophoria or the physiological esophoria; and third, that it is quite possible, in some cases, to apparently increase the amount of manifest myopia by means of the treatment procedure.

The reason for this increase in the manifest myopia is somewhat obscure. It is apparent that there is an initial inhibition to the accommodation resulting from the convergent inhibition afforded by the base-in prisms. This lasts for only a short time which the accommodative inhibition seems to disappear, thus restoring the old accommodative status without changing, however, the new convergence conditions. We have, therefore, habituated the individual to a new accommodative-convergence relationship in which there is actual divergence of the visual axes for distance with no change in the actual ciliary tonicity. When the base-in prisms are removed from such a case, the immediate result of the relative convergence of the visual axes might be the stimulation of a tendency to accommodation. Why there should be this result in the cases discussed in this report, however, is hard to see, as in practically all of them the accommodative-convergence reflex was almost absent. In the experience of the writer, this would be significant of the lack of any very effective convergent-accommodative stimulation, whereas such a stimulation seemed to be present in the cases discussed.

It is true that the lack of success in the majority of the cases reported may be due to faulty methods of diagnosis or lack of persistence in the corrective procedures. On the other hand, it is quite possible that the functional myopia apparently present in these cases, as well as in those where the amount was increased, was due to factors other than those involved in the convergence relationships. There can be no question that ciliary hypertonicity can be the result of purely proprioceptive action resulting from mildly excessive ciliary use. This is apparently especially true where there is low corneal astigmatism with attempted lenticular compensation while we rarely find accommodative "cramps" in cases where there is no such compensation as in high corneal astigmatism or simple hyperopia or myopia.

For practical purposes and to afford a basis for further study the writer suggests that functional myopic cases may be divided into the following tentative classifications:

1. Proprioceptive.
2. Convergent-accommodative.

In the proprioceptive group would be placed those individuals who have a poorly associated accommodation and convergence as shown by a high physiological exophoria with the approximate cor-

rection. For the most part, these cases will probably show some lenticular astigmatic compensation. Base-in treatment in this type of case is contra-indicated.

The convergent-accommodative group would include those presenting low physiological exophoria or physiological orthophoria or esophoria with the approximate correction. Such cases may or may not show compensatory astigmatic action. With this group, base-in treatments may be prescribed with some hope of success and with the assurance, at least, that no untoward results may be expected. In any case, however, these treatments should never be given unless three is absolute control of the patient and frequent opportunity to observe any changes in the accommodative status.

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OBSERVATIONS ON THE EXPERIMENTS BEING CONDUCTED ON THE VALUE OF RED-FREE LENSES IN CATARACT PROPHYLAXIS*

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and
E. LeRoy Ryer, Opt. D., F. A. A. O.,
New York, N. Y.

The fact has insistently knocked at our consciousness over a period of many years that certain types of cataract are associated with occupational conditions involving the over-exposure of the eyes to excessive heat. Time and time again we found ourselves anticipating the history and interrupting the patient's recital with the question—"Is not your occupation that of baker, chef, cook, glass-blower or such as involves undue exposure to more than the usual heat"—and in time we realized it was a peculiar type of cataract observed in our routine preliminary examination that prompted the question.

Investigations were started on the hypothesis that under certain pre-disposing conditions an eye over-exposed to red and infra-red radiations will develop cataract and, conversely, that cataract might be prevented in such cases by precised corrective lenses made of glass which would absorb these radiations.

Coincident with this, we were examining at one of the New York hospitals the eyes of all the patients presenting themselves at its cardiac and diabetic clinics and observing with significant regularity that those cases wherein acidosis was marked, the vitreous, crystalline lens, and aqueous were usually cloudy, the visual acuity much lowered, and the crystalline lens often definitely cataractous.

As far as history could show the subjective cloudiness, and by inference the cataract, developed sometime after the diabetes had been known to exist.

Those cases with blood sugar above 3 per cent and an accompanying acidosis wherein the vitreous and aqueous, but not the lens, were involved improved objectively in clearness of media and subjectively in visual acuity as the blood sugar was reduced through treatment.

It appeared that unless the acidosis had persisted over a long period the lens did not seem to become involved but sufficiently persistent acidosis usually involved the lens and, once involved, the

*An abridgement of material presented before the American Academy of Optometry at Boston, Mass., Dec. 17, 1929.

lens did not improve while the vitreous and aqueous did with the establishment of alkalinity and the decrease of blood sugar.

Light therapy was applied to some of these diabetics in the hope of favorably modifying the acidosis. The reactions were encouraging. An analysis of the quality of the light employed proved it to be high in violet and low in red, strong actinically, weak thermally.

From our general observations we drew the following summary:

1. Occupational over-exposure to thermal radiations causes cloudiness of vitreous and aqueous in cases suffering from diabetes, nephritis, or acidosis.

2. Deleterious crystalline lens involvement occurs under similar circumstances where the acidosis is permitted to persist over a long period.

3. Ultra-violet light therapy used to help produce alkalinity improves the visual acuity by reducing vitreous and aqueous cloudiness.

This summary in turn presents a fairly well defined problem, namely:

As ultra-violet and violet radiations applied generally reduce local ocular cloudiness, may not vitreous, lens, and aqueous cloudiness be caused by infra-red and red radiation and, if so, cannot this clouding of these media be avoided or retarded by the use of corrective lenses transmitting only red-free light?

The first experiments we made were with normal crystalline lens tissue subjected to alkaline and acid reactive fluids; alkaline agents left the lens tissue as it was while acid agents caused nebulae; and, furthermore, the acid nebulae were somewhat reduced by re-immersing the tissues in the alkaline fluid.

Controlled experiments followed with goldfish in seven forms of tank, six fish in each tank and the tanks constructed as follows:

Tank 1. Ruby red glass transmitting a maximum amount of red (see Fig. 1).

Tank 2. "D" shade Calobar glass, supplied by A. O. Co., transmitting a minimum amount of red (see Fig. 2).

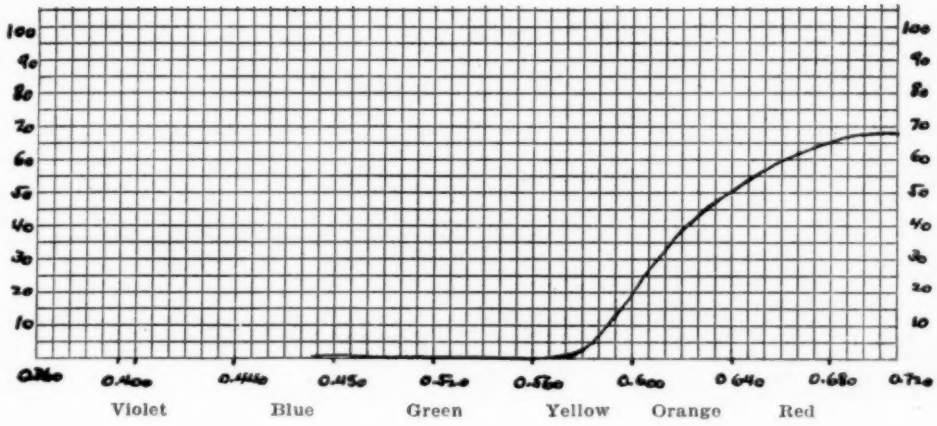
Tank 3. Red-free glass, supplied by B. and L. Co., transmitting a minimum amount of red (see Fig. 3).

Tank 4. Ordinary commercial window-pane glass.

Tank 5. "B" shade Euphos glass transmitting about 50 per cent of the red and 90 per cent of the violet (see Fig. 4).

Tank 6. Ordinary white glass similar to No. 4, but exposed to red light from colored bulbs.

RUBY RED TANK 1.

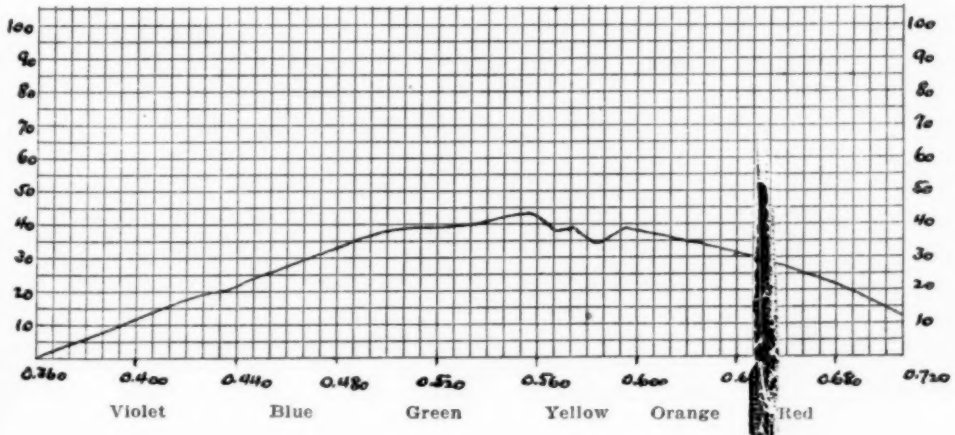


E. E. Hotaling. Figure 1.

D. SHADE CALOBAR A. O. CO. TANK 2.

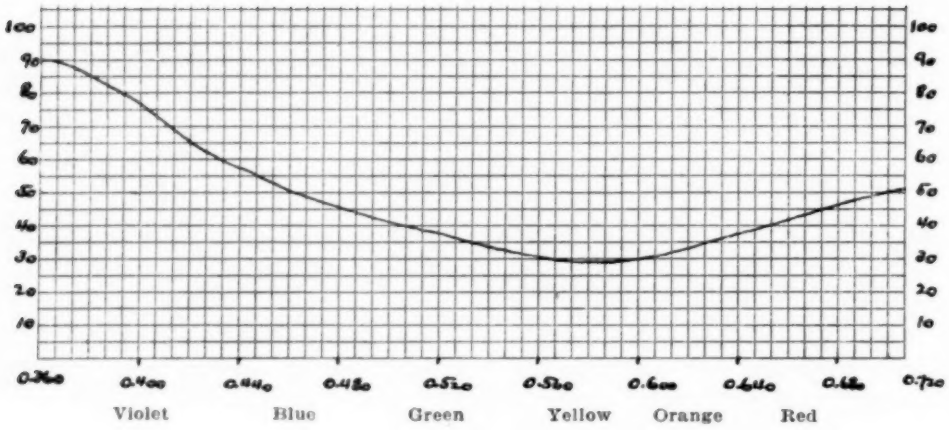
RED. FREE B. & L. TANK 3.

Each of the above are approximately alike.



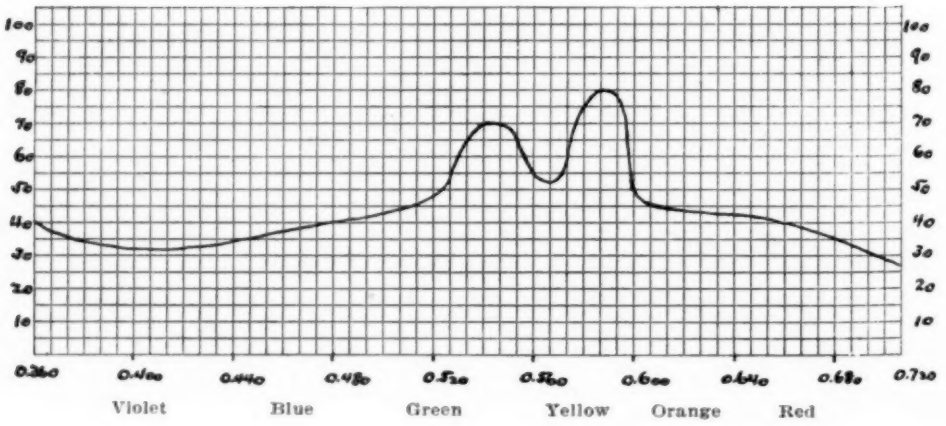
E. E. Hotaling. Figures 2 and 3.

B. EUPHOS. TANK 5.



E. E. Hotaling. Figure 4.

B. CROOKS. TANK 7.

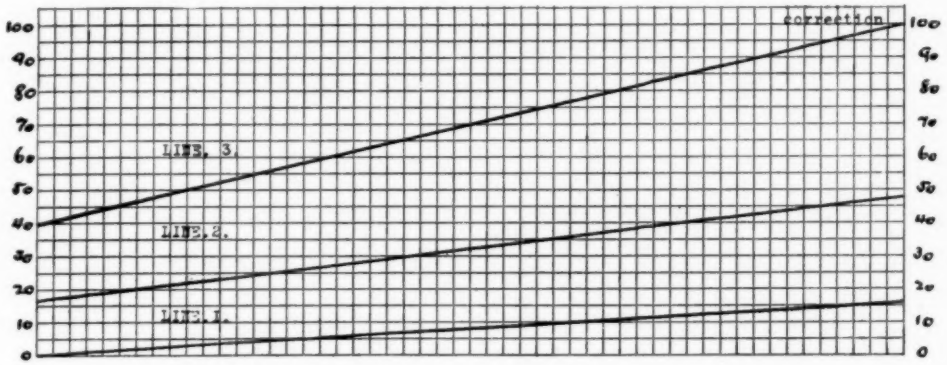


E. E. Hotaling. Figure 5.

Line 1 indicates 18 cases of nuclear cataract, ages 59 to 79.
Line 2 indicates 4 cases of striated cataract, ages 60 to 72.
Line 3 indicates 10 cases of cloudy media, ages 37 to 76.

The percentage figures at left indicate visual acuity without correction.

The percenatge figures at right indicate visual acuity with red-free correction.



E. E. Hotaling. Figure 6. Showing the result of Red-Free glass in correcting lenses in 32 cases of which 20 were myopic and 12 were hyperopic.

Tank 7. "B" shade Crookes glass transmitting a little more violet than red but only about half as much of either as of yellow and green (see Fig. 5).

As stated above six fish were kept in each tank, 328 were used in all, and each was used up to the time of its death.

Many difficulties were met and overcome. The various tanks were not procurable ready-made nor could we find ready-made any tank makers or others who would attempt to make water-tight tanks out of the odd pieces of glass we could supply, odd necessarily because we could not procure large sheets of the various kinds of glass used in the seven tanks. Try building water-tight tanks of odd shaped pieces of glass and you will experience some of the joys of research work, so glibly talked about! Again assistants would forget to feed the fish or keep the water up to the standard required and often at a critical point in the work when to do so meant serious setback and all the work to do over again. However each tank has taught us, thus far, as follows:

Tank 1. Cataract or cloudy media with post-mortem showing 80 per cent acidosis in media.

Tank 2. Cataract retarded but in no case eliminated. Period of development of opacity extended to eight weeks but acidosis remained.

Tank 3. Results similar to those in Tank 2.

Tank 4. Cataract not developed in this tank but those which had developed cataract in Tank 1 retained them. The retardation of cataract in this tank was slightly greater if anything than in Tanks 2 and 3 indicating, possibly, no difference between the value of white or red-free lenses in retarding cataract after it was once definitely established.

Tank 5. Eyes remained unchanged but the fish developed fungus growth on scales and died, due probably to the absorption of the violet and ultra-violet.

Tank 6. Developed cataract or cloudiness in essentially the same way and time as in Tank 1.

Tank 7. Results similar to those of Tank 4.

In Tanks 1 and 6, red light only, the fish became blind and died of starvation because of inability to find their food which accumulated and decayed at the bottom of the tanks.

These results seemed to justify the use of red-free glass on any patient showing cloudy media or incipient cataract and we have applied red-free lenses to date to thirty-two such cases and chartered the results in Fig. 6.

We are, of course, aware that the results thus far do not justify any final deduction but we think they do justify further investigation and greater co-operation from those in a position to help, especially those in the Academy.

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AMBLYOPIA EX ANOPSIA

For many years optometrists have been performing remarkable services for patients in treating various innervational defects of the eye. In fact most of the progress which has been made during the last fifteen years in this field has been made under optometric supervision and by optometrists. This is properly so as this field of activity is entirely optometric and is therefore the proper sphere for development by optometrists. No type of this treatment work has been more successful in the average run of cases than the treatment of amblyopia ex anopsia, and no type of case better illustrates the need for optometric application of treatment techniques than do these cases of amblyopia ex anopsia.

Prior to the application of optometric techniques in these cases little or nothing was done for patients affected with this condition. Ophthalmologists for years had informed these patients that nothing could improve the vision in an eye once amblyopic, and it remained for optometry to develop treatment techniques which would restore vision to these otherwise useless eyes. In this our profession has performed an outstanding service to mankind. It is a definite optometric achievement and the credit belongs entirely to optometry.

To illustrate the type of results which can be secured by optometrists in these cases of amblyopia ex anopsia, I will briefly review a case report as presented by Dr. Thomas Costa in the Rhode Island

Optometric Journal. Patient, female, age 32 years. Visual acuity, Right eye 15/300, Left eye 15/50. Ophthalmoscopic picture, negative. The right eye was apparently hyperopic to the extent of one and one-half diopters, which, when corrected, did not materially improve vision. After an exhaustive examination a diagnosis was made of amblyopia ex anopsia in the right eye and typical optometric treatments were given. Vision improved over a period of months and the case was finally dismissed with the following correction:

O. D. + 2.50 D. Sph. ⊃ + 0.50 D. Cyl. Axis 90
O. S. + 1.00 D. Sph. ⊃ + 0.75 D. Cyl. Axis 75

This gave the patient the following visual acuity: Right eye 15/15, Left eye 15/15. The case just presented is typical of many which have been treated by optometrists and in which vision in the amblyopic eye has been entirely restored.

These techniques, while by no means complete, have progressed at the present time to the point where it is reasonably safe to say that in any amblyopic ex anopsic case, vision can be improved. It is not always possible to bring it up to normal but almost invariably sight can be restored to such an extent that the patient not only has binocular vision but has proper binocular co-ordination and is therefore benefitted immeasurably in such important matters as depth perception, wider fields, etc. This type of treatment technique illustrates the value of research and study by members of our profession. The field is by no means covered and the successes that have come to us as optometrists in treating cases of amblyopia ex anopsia should spur us onward towards additional successes in our problem cases of pseudo myopia, cases of imbalances between accommodation and convergence and in squint cases.

C. C. K.

ANNOTATIONS AND SOCIETY PROCEEDINGS

The American Journal of Optometry is the Official Organ of the American Academy of Optometry, as well as the Organ of the Arkansas, Delaware, Indiana, Iowa, Maine, Maryland, Michigan, Minnesota, Nebraska, North Dakota, Oklahoma, Pennsylvania, South Dakota, Vermont and West Virginia Optometric Associations.

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AN APPROVED LIST OF OPHTHALMOLOGISTS

The writer notes that British ophthalmologists, as a group, are objecting to some of their members working with optometrists in the various refraction hospitals in England. From time to time similar opposition has occurred here in America, particularly with reference to ophthalmologists accepting places on programs of state and local optometric societies.

Just why this opposition arises is sometimes hard to tell. Whether it is the natural outgrowth of the antagonistic attitude, characteristic of many ophthalmologists towards optometry or whether it is jealousy on the part of those ophthalmologists who are not invited to participate, remains a question. The writer has long suspected that the latter reason is the chief cause.

It has been obvious for many years that any ophthalmologist who conducts himself in an ethical and friendly manner towards optometrists benefits in many ways because of this gentlemanly conduct. In the first place by acting in this manner he becomes conspicuous and outstanding in the judgment of optometrists in the community in which he lives and for this reason the local optometrists see to it that he is given opportunities to present himself before them on their programs and also that all cases which must be referred to a physician are promptly sent to him. In the second place optometrists being human naturally make it a definite point to see to it that their patients do not fall into the hands of those men who have, by their actions, proven themselves to be unfriendly. It is therefore also natural that

the unfriendly ophthalmologist objects to having the friendly one make these contacts and, in the writer's belief, this constitutes a major reason for this organized opposition to this participation of an individual ophthalmologist in optometric activites.

Therefore, the point seems proven that the ethical ophthalmologist places himself in an advantageous position over his unscrupulous colleague who is constantly on the alert to not only criticise the optometrist, but who also thinks nothing of deliberately accepting a referred case of, say conjunctivitis, and then blandly refracts this same case after the conjunctivitis has cleared up. The ethical practitioner, on the other hand, treats the infection and then returns the case to the optometrist to have the refraction completed by him. This matter has been brought to the writer's attention very forcibly in the last several weeks by several correspondents. The first cites a case of a patient who came to him for an ocular examination. This patient was suffering from iritis. The optometrist explained to the patient the nature of the condition and suggested that this be cleared up prior to having his glasses changed, at the same time referring the patient to a nearby ophthalmologist, with a note requesting that when he had finished his work that the patient be returned to him for refraction. Six weeks later the patient returned with a pair of glasses that had been prescribed by this ophthalmologist. The patient apologized to the optometrist for not returning to the optometrist for his refraction but said that the physician had insisted that he examine and prescribe for his visual defects, saying at the same time that the optometrist who had referred the case to him was not capable of making the refraction. In this case, however, it so happened that the ophthalmologist himself was unequal to the task of refracting this pair of eyes and to get comfort the patient had to return to the optometrist to whom he called on in the first place.

This is a typical example of what is constantly taking place in the offices of unscrupulous ophthalmologists who think nothing of deliberately stealing the patients of someone else who are referred to them. In the case just cited the local optometrist stood before his state society and explained the entire matter to some two hundred and fifty optometrists giving the names of all parties involved. Obviously, no optometrist present would ever think of referring another case to this ophthalmologist who permitted his selfish greed to block all future referred work from optometric sources. It is hard to understand the workings of the mind of a man as short-sighted as this ophthalmologist, yet, as I have said before, it frequently occurs and continues only because certain ophthalmologists reason, that because of their prestige that they can continue to fool the unsuspecting optometrist. It may be possible to do this sort of thing occasionally but sooner or later one is bound to be caught at this unethical procedure and the results are then more or less disastrous.

A Portrayal of Optical Progress

New Bausch & Lomb Historical Paintings a distinct service to Optometry in particular and science in general. ◆

WHETHER you are an upstairs optometrist, or one with a first floor location, you will be interested in the new Bausch & Lomb Optical Progress paintings. They measure 15 inches by 19 inches in size, and are reproduced in full color lithography, with even the texture of the brush marks faithfully recorded by a special process. These are indeed remarkably beautiful facsimiles which may be cherished and used for years to come. They are not commercial in appearance; they are free from advertising; they are truly unselfish in their concept and execution.

Following are the subjects portrayed in the six different paintings:

"Spectacles in China" portrays on three distinguished Chinese scholars of the middle ages different styles of glasses that were in vogue in the Orient centuries and centuries ago.

"Galileo" is pictured in middle life as he demonstrated his first telescope from the tower of St. Mark.

"Street Vendors of the Middle Ages" is an interesting study that faithfully portrays the costumes, the glasses and the method of dispensing them at a time when they were first receiving public recognition.

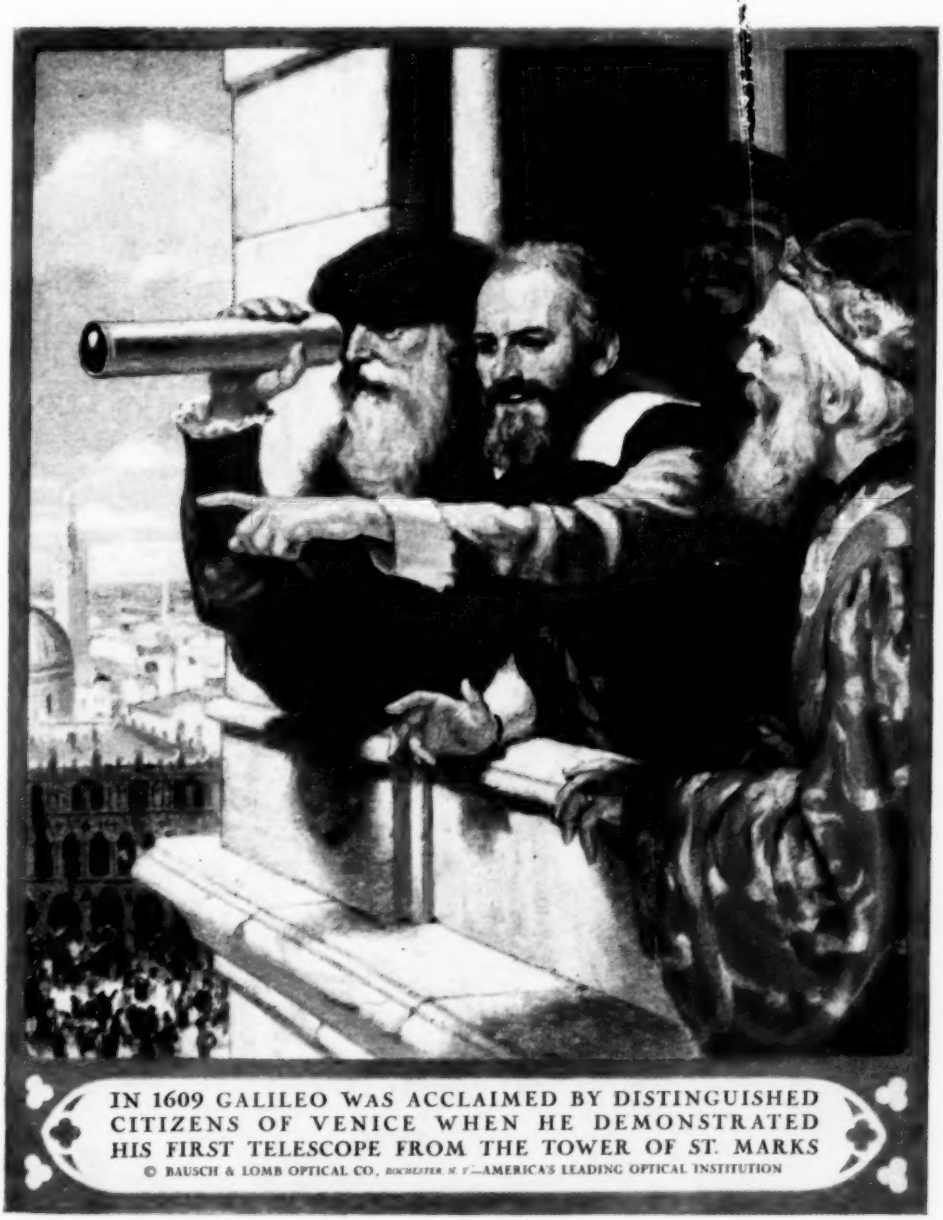
"Sir Isaac Newton" portrays the eminent physicist conducting one of his experiments with a prism and follows rather carefully an old wood cut of a similar character.

"Thomas Young", who was the first to explain astigmatism and the theory of accommodation, is shown in a picture that has high attention value and unusual interest.

"Antoni Van Leeuwenhoek", the first of the microbe hunters, is pictured on the eventful day that he discovered bacteria over two hundred and fifty years ago.

These pictures are offered to Orthogon users in connection with a new plan which salesmen of Bausch & Lomb and their distributors will be glad to discuss.

WE present below a four color reproduction of one of the paintings. Of course, the pictures themselves are much more effective, as they faithfully record all of the subtle tones and colorings.



IN 1609 GALILEO WAS ACCLAIMED BY DISTINGUISHED CITIZENS OF VENICE WHEN HE DEMONSTRATED HIS FIRST TELESCOPE FROM THE TOWER OF ST. MARKS

© BAUSCH & LOMB OPTICAL CO., ROCHESTER, N. Y.—AMERICA'S LEADING OPTICAL INSTITUTION

The other case referred to is exactly opposite. A patient was referred to an ophthalmologist by a local optometrist for a diagnosis. This was at once made and the case returned with a note advising the optometrist to proceed with his refraction. In this instance, the ophthalmologist (who was then a new man in that community) advises us that at least once a week since this time one of three local optometrists send him work, most of which, had formerly been referred to a specialist in a nearby city as the old local ophthalmologist had been unfriendly. Here is an ophthalmologist who realizes the ethics of his position when handling a case referred to him by a fellow professional man and the optometrists of his community have been quick to see to it that he is called in on every questionable condition which may possibly arise. Such co-operation is not only beneficial to the patient but to the ophthalmologist as well, and it is surprising that more practitioners of this group do not work in closer harmony with us, because of these facts.

Our first correspondent suggests preparing a list of ophthalmologists who will handle referred cases in an ethical manner. In this the writer is heartily in accord. A few of these men do exist in every community and we believe it is the duty of every local society to prepare and circulate among its members the names and addresses of those ophthalmologists to whom patients can be safely referred and the writer also believes it is the duty of local societies to publicly expose those ophthalmologic-grafters to whom no referred work can be safely sent.

C. C. K.

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ORGANIZING FREE CLINICS

A short time ago the writer received a communication from an optometrist in an eastern city relative to the establishment of a free optometric clinic in that city. This eastern correspondent announced that he was planning to raise a fund of money which, when it had reached a certain figure, would be employed in developing a free optometric clinic. He was entirely sincere in his efforts and no doubt will attempt to raise such a fund.

Without a doubt this is a splendid plan if it can be carried through to its conclusion. It is a fine idea to start a clinic with all the equipment paid for and with a nice cash balance in the bank. However, experience has proven that very few such clinics are established. In fact, I believe I am safe in saying that to date no such clinic has been established and the reason is obvious. It is an exceedingly difficult thing to get people to contribute money over a period of time for an abstract idea. People do not care to contribute their funds when these are merely placed on deposit in some savings bank and for this reason very few such funds have been raised.

On the other hand, when a local society decides to organize a

clinic instead of first raising a fund they should first establish the clinic irrespective of how small the beginning. After the clinic has been opened and is a going concern, then, and not until then, should the drive for funds be made, because in attempting to raise the money in this manner they then have something definite and concrete to point to: There is the clinic! Here are our patients! Here is our need! With these pleas it is far easier to get the money to keep the clinic open, and as success comes to the clinic it constantly becomes easier to enlarge and broaden its sphere of usefulness.

The first Refraction Hospital in London started in this manner. There was very little money on hand and its original facilities were exceedingly meager. Had its founders waited until a large sum of money had been subscribed there would now be no Refraction Hospital in London. That is also true of clinics here in America. Eighteen months ago, for instance, when the Optometrists Free Eye Clinic of Minneapolis was organized and established, the society which backed this clinic not only lacked a fund of money but actually at the time the clinic was opened showed a deficit, yet the need for a clinic was pressing and it was established and for the last eighteen months this clinic has been in successful operation. It has helped many hundreds of needy individuals in this city and at no time was any large fund of money available for its use. However, because this clinic was open and its needs were apparent, ways were found from month to month to raise the necessary subscriptions to enable it to continue in operation. As long as the needs exist and as long as the clinic serves as a focal point for optometric endeavor in Minneapolis, so long will the clinic continue in operation.

The important point that the writer is attempting to make is this: optometric clinics, when properly managed, can produce immeasurable benefits to the community in which they are established and to the profession in back of them. These clinics have a definite place in our professional life and every city should have at least one such center. It is not necessary to first raise a large sum of money to finance these clinics. All that is needed is a certain amount of determination and effort on the part of a few conscientious optometrists. Instead of raising a fund of money they should just organize the clinic itself and after its doors have been opened and the staff appointed, then, and not until then, should the drive for funds be made.

C. C. K.

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BACK COPIES

The Pennsylvania State College of Optometry wishes to secure an April, 1930, copy of the American Journal of Optometry in order to complete its files. Anyone who can spare that copy is requested to send it direct to Dr. Edwin F. Tait, Registrar, 1809 Spring Garden Street, Philadelphia, Pa.

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OKLAHOMA ASSOCIATION OF OPTOMETRISTS

According to Dr. E. B. Alexander, secretary of the Oklahoma Association of Optometrists, four educational meetings were held in that state during March. The first on March 10th was held at Tulsa under the direction of Dr. J. F. Batton. The second on March 11th was held in Oklahoma City under the direction of Dr. W. S. Farmer; the third held on March 12th at Perry, under the direction of Dr. C. H. Beavers, and the fourth on March 15th was held at Duncan under the direction of Dr. Edward Carr. The program in each instance consisted of three talks, "Building the Tables of Expecteds," "Public Education," and "Instrumentation." All members received copy of the talks prior to the meeting and at each meeting three optometrists led the discussion.

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OHIO OPTOMETRIC ASSOCIATION

Dr. Quinton Keim of the Toledo Society of the Ohio Optometric Association announces that the annual meeting of that society will be held at Toledo on May 31st, June 1st and June 2nd. Dr. Morgan C. Davies of the Optometry School at Ohio State University, Prof. Zoetout of the Northern Illinois Optometry College, Prof. Melrose of Milliken University and Dr. Julius Neumueller of the Penn State College of Optometry will be the principal speakers.

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INDIANA STATE EDITOR

The president of the Indiana State Association of Optometry recently appointed Dr. Forrest W. Freeman to serve as editor for the State Association on the editorial staff of the American Journal of Optometry. Dr. Freeman graduated from the first class of the Ohio State University Optometry School.

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MISSISSIPPI VALLEY SOCIETY

Dr. Frank E. Isabel of Clinton, Iowa, announces that the annual meeting of the Mississippi Valley Optometric Research Society held its annual meeting at Sterling, Illinois, on Tuesday, March 31st. The following men were elected to serve for the coming year: Dr. Frank E. Isabel, president; Dr. E. Musk, vice-president; Dr. John Barrett, secretary-treasurer. This society meets monthly for educational purposes.

The
ORTHOGON
BUSINESS BUILDER

The 40 pages of this book are crammed full of ideas and business builders—the new display program, direct mail pieces, advertising ideas—in fact, every kind of promotional assistance, every phase of which is specifically designed for effective use by optical practitioners.